



Assuring the broad uptake of OC data services

Gianluca Volpe

Institute of Marine Science, Rome

Italian National Research Council

CMEMS – Copernicus Marine Environment Monitoring Service

CMEMS is a European system composed of

- 1 Dissemination Service, a single contact point for
 - Data browsing, viewing
 - Get information
 - Data quality – validation results
 - Data documentation (ATBDs)
 - Data downloading

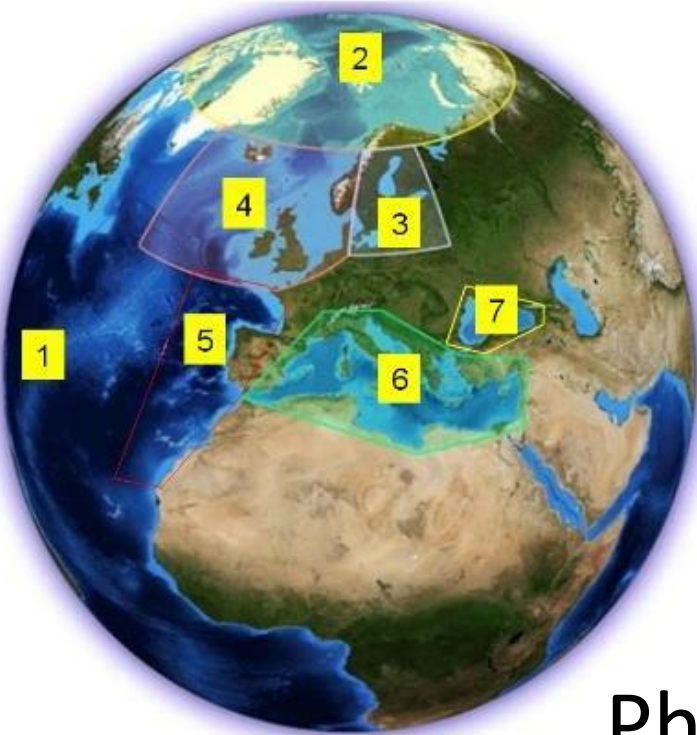
A unique online catalogue
FREE and **24/7** service for any
marine-oriented application



CMEMS – Copernicus Marine Environment Monitoring Service

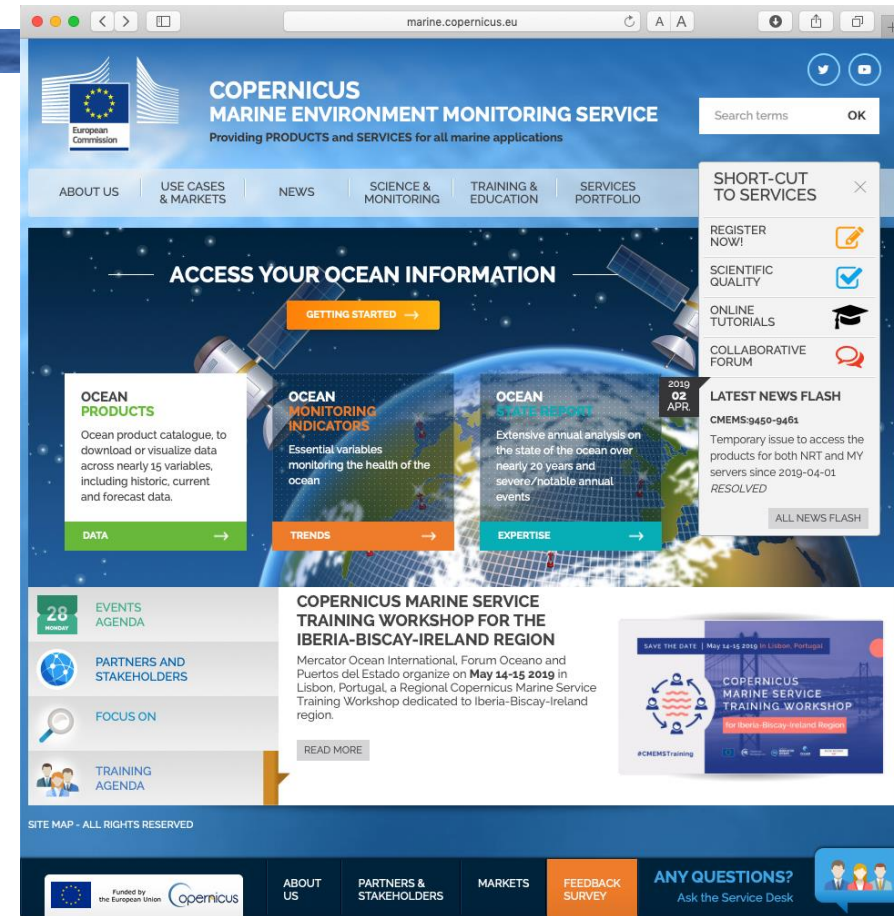
CMEMS is a European system composed of

- 1 Dissemination Service, a single contact point for
- 7 Modelling Forecasting Centers (MFCs)



- 1. Global
- 2. Arctic
- 3. Baltic
- 4. NWS
- 5. IBI
- 6. Med Sea
- 7. Black Sea

European seas



Physical and biogeochemical variables

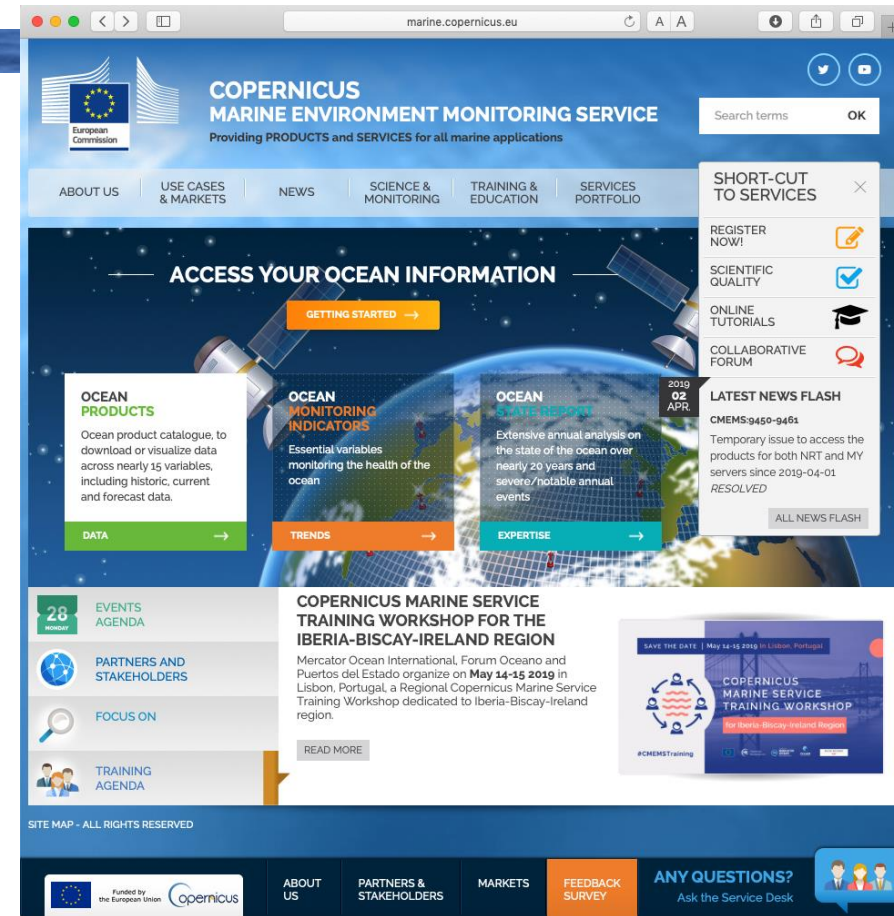
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- 1 Dissemination Service, a single contact point for
- 7 Modelling Forecasting Centers (MFCs)
- 8 Thematic Assembling Centers (TACs): OBSERVATIONS
 - In situ
 - Multi-observations
 - Sea ice
 - Wind
 - Sea level
 - SST
 - Wave

- **Ocean Color**

181 Products



CMEMS – Copernicus Marine Environment Monitoring Service

Ocean Color TAC products

- **CHL** – Phytoplankton chlorophyll concentration
 - Merged Case 1 & Case 2
- **Optics**
 - Rrs
 - IOPs
 - Kd490
 - Secchi depth
 - PAR
 - SPM



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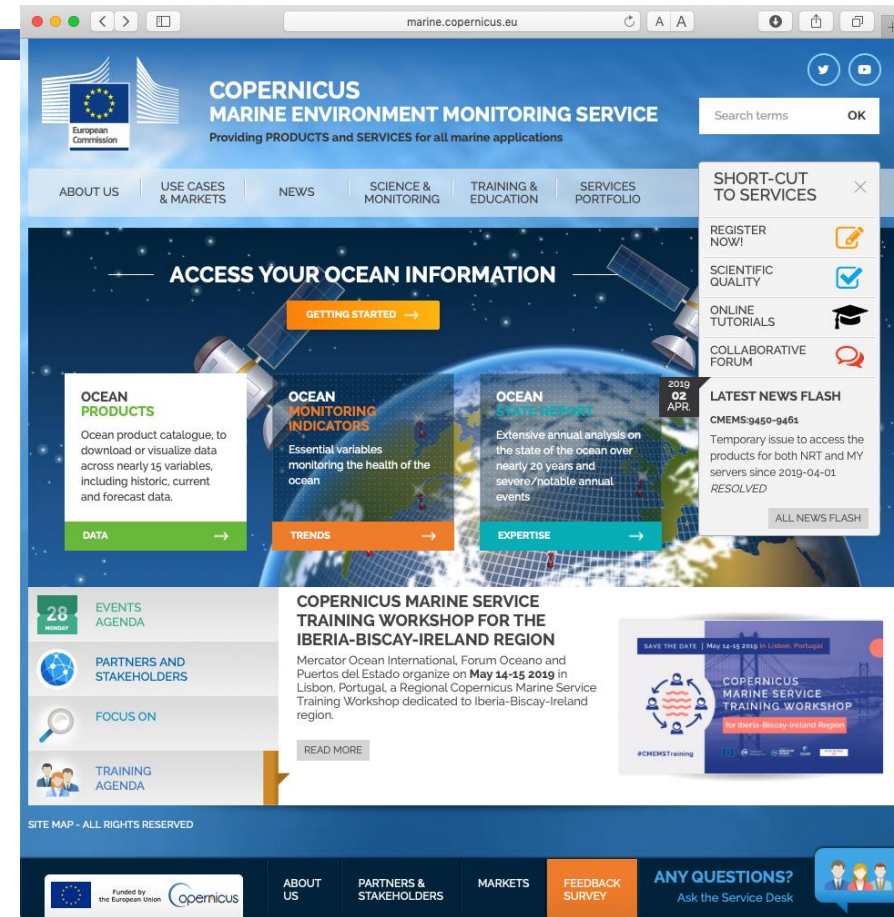
OCTAC products

- **CHL** – Phytoplankton chlorophyll concentration
- **Optics**

Products are operationally available in **2 processing Levels**

- **L3** – daily composite products, single/multi sensor
- **L4** – daily interpolated and weekly/monthly composites

POTENTIAL CONFLICT: 1Q → 1A



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OCTAC products

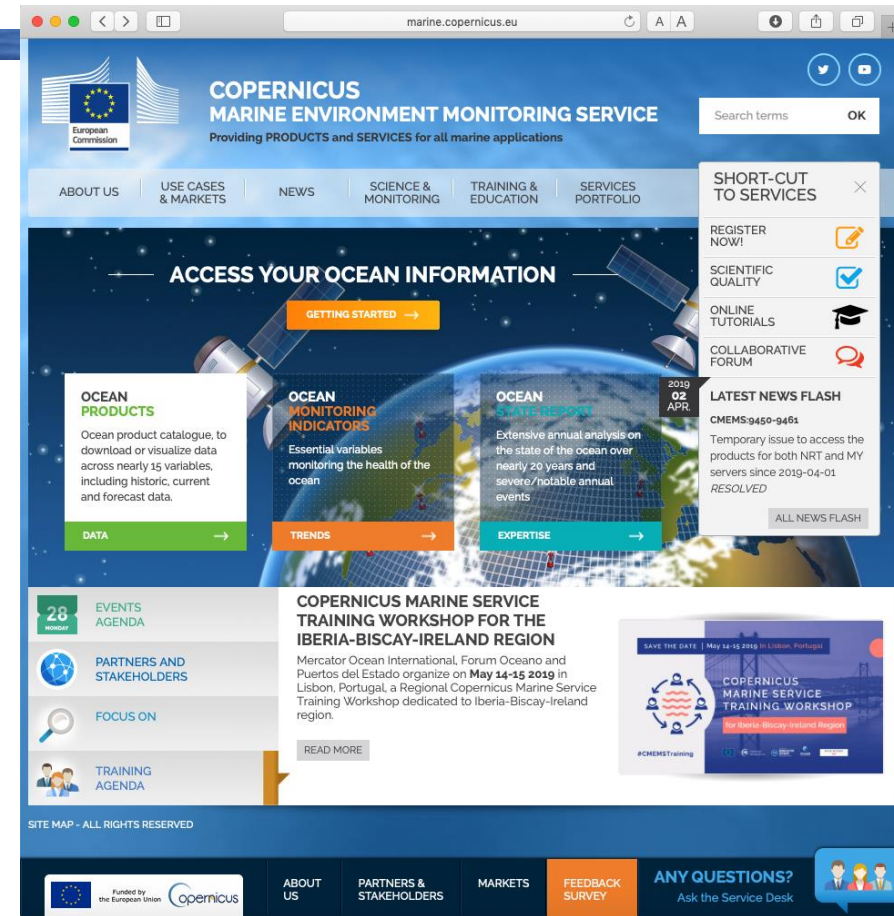
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Products are operationally available in 2 **processing Levels**

- **L3** – daily composite products, single/multi sensor
- **L4** – daily interpolated and weekly/monthly composites

Products are operationally available in 3 **processing Modes**

- **NRT** – produced within few hours
 - **DT** – waits for updated ancillary data
 - **REP** – consistent re-processed time series
- generally stops in correspondence of NRT/DT start-time



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OCTAC products

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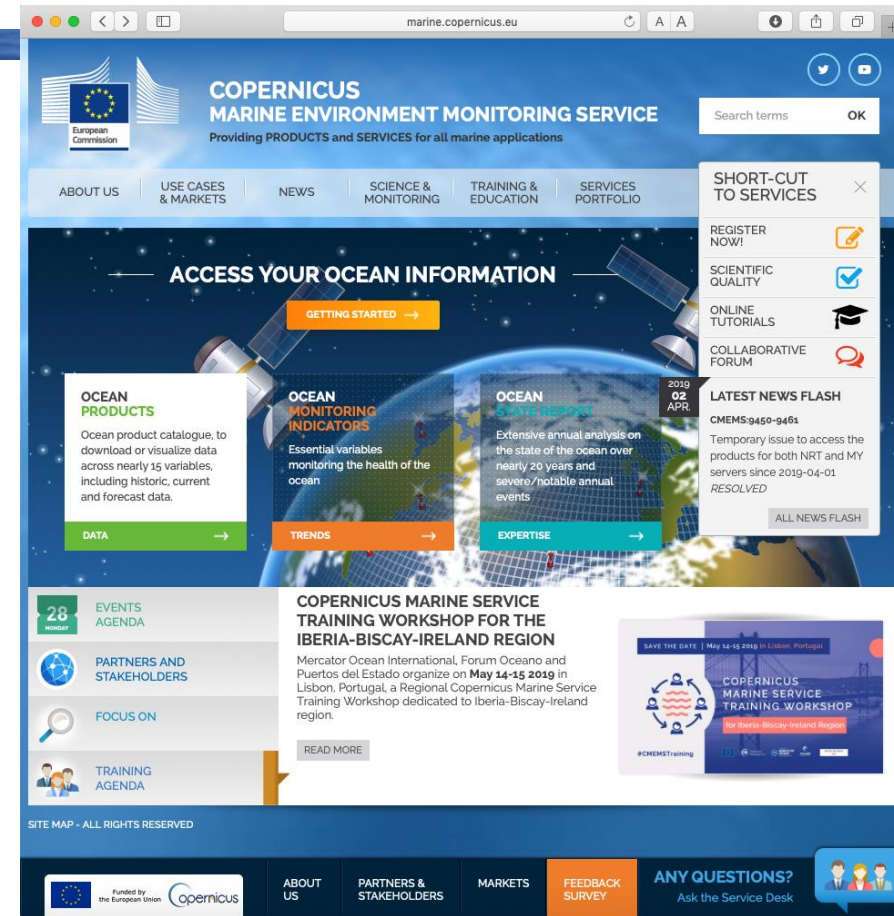
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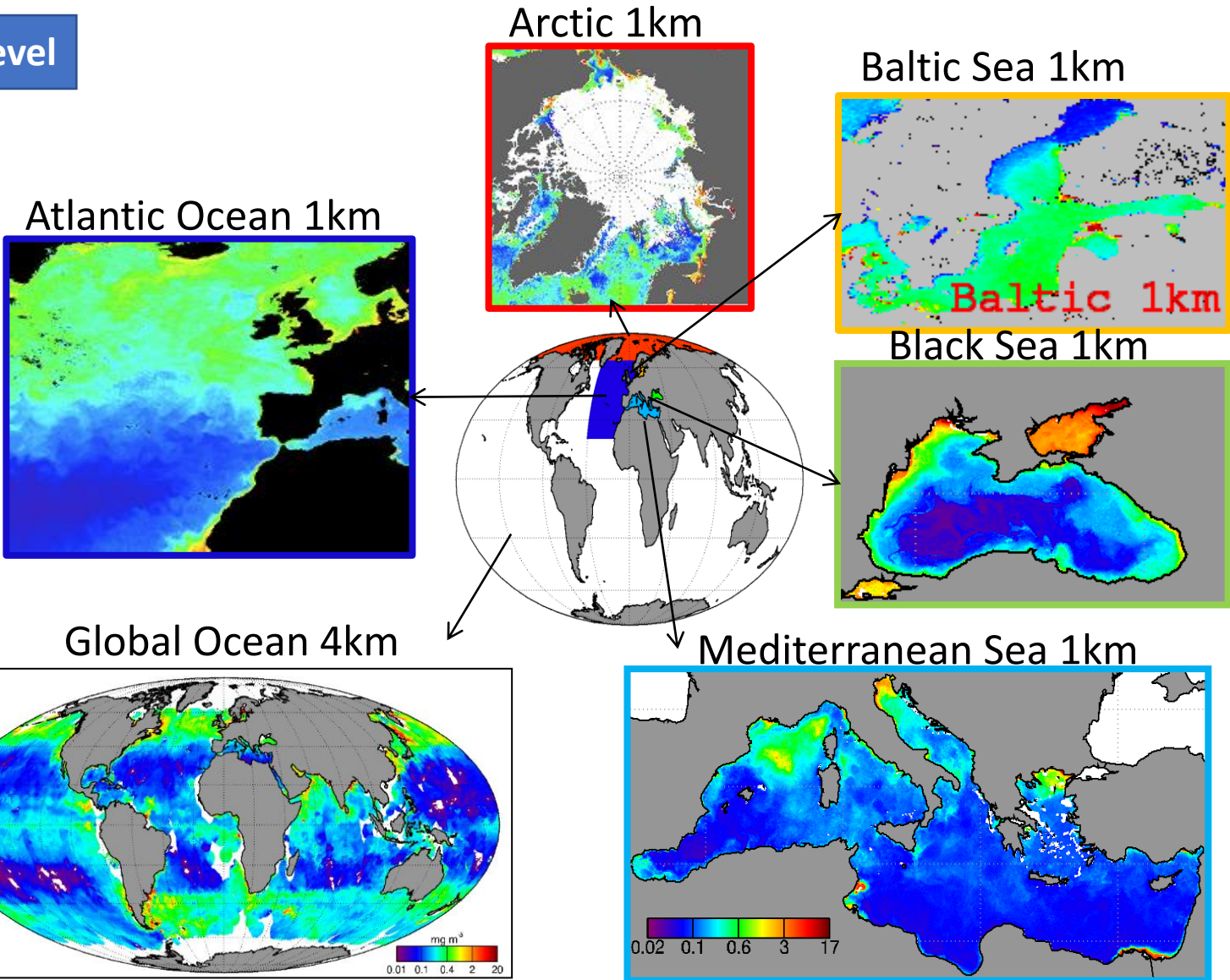
- **NRT**
- **DT**
- **REP**

Pros & cons (fitness-for-purpose) must be clearly set out ALSO for non-expert users



Ocean Colour Thematic Assembly Centre – product overview

CMEMS Region	Processing Mode		Processing Level
Global	NRT	REP	L3/L4
Arctic Ocean	NRT	DT REP	L3/L4
Baltic Sea	NRT	DT REP	L3/L4
North West Shelf	NRT	DT REP	L3/L4
Black Sea	NRT	DT REP	L3/L4
Mediterranean Sea	NRT	DT REP	L3/L4
European seas	NRT	REP	L3



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European seas	NRT REP	L3

Atlantic Ocean 1km

L3: Jackson & Grant, 2016
L4: OI scheme

Global Ocean 4km

L3: Maritorena et al (2010)
L4: OI scheme

Arctic 1km

L3: Jackson & Grant, 2016

Baltic Sea 1km

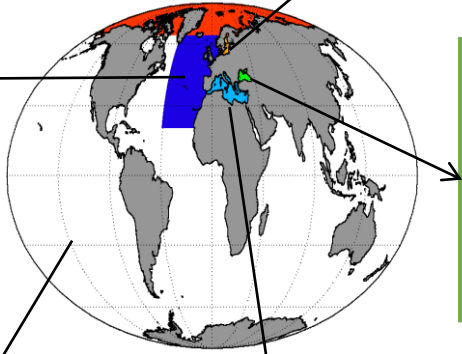
L3: HZG regional processor

Black Sea 1km

L3: Zibordi et al., 2015 (Case1) + Kajiyama et al., 2018 (Case2)
L4: DINEOF (Volpe et al., 2018)

Mediterranean Sea 1km

L3: Volpe et al. (2019)
L4: Volpe et al. (2018)

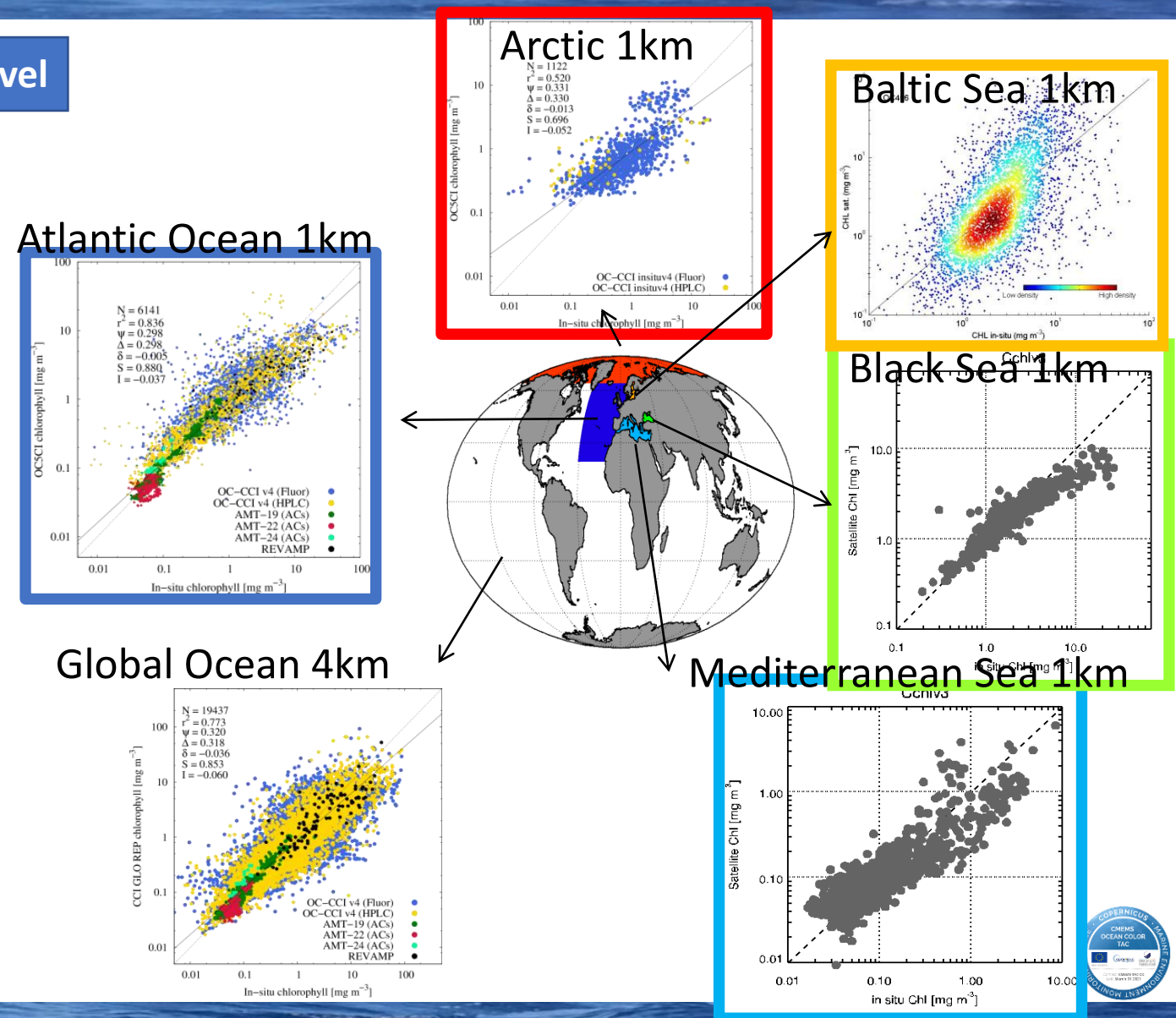


Regional products produced using regional algorithms to improve their quality

Ocean Colour Thematic Assembly Centre – product overview

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Baltic Sea	NRT DT REP	L3/L4
North West Shelf	NRT DT REP	L3/L4
Black Sea	NRT DT REP	L3/L4
Mediterranean Sea	NRT DT REP	L3/L4
European seas	NRT REP	L3

**all product types are checked for
quality through dedicated
validation analyses**

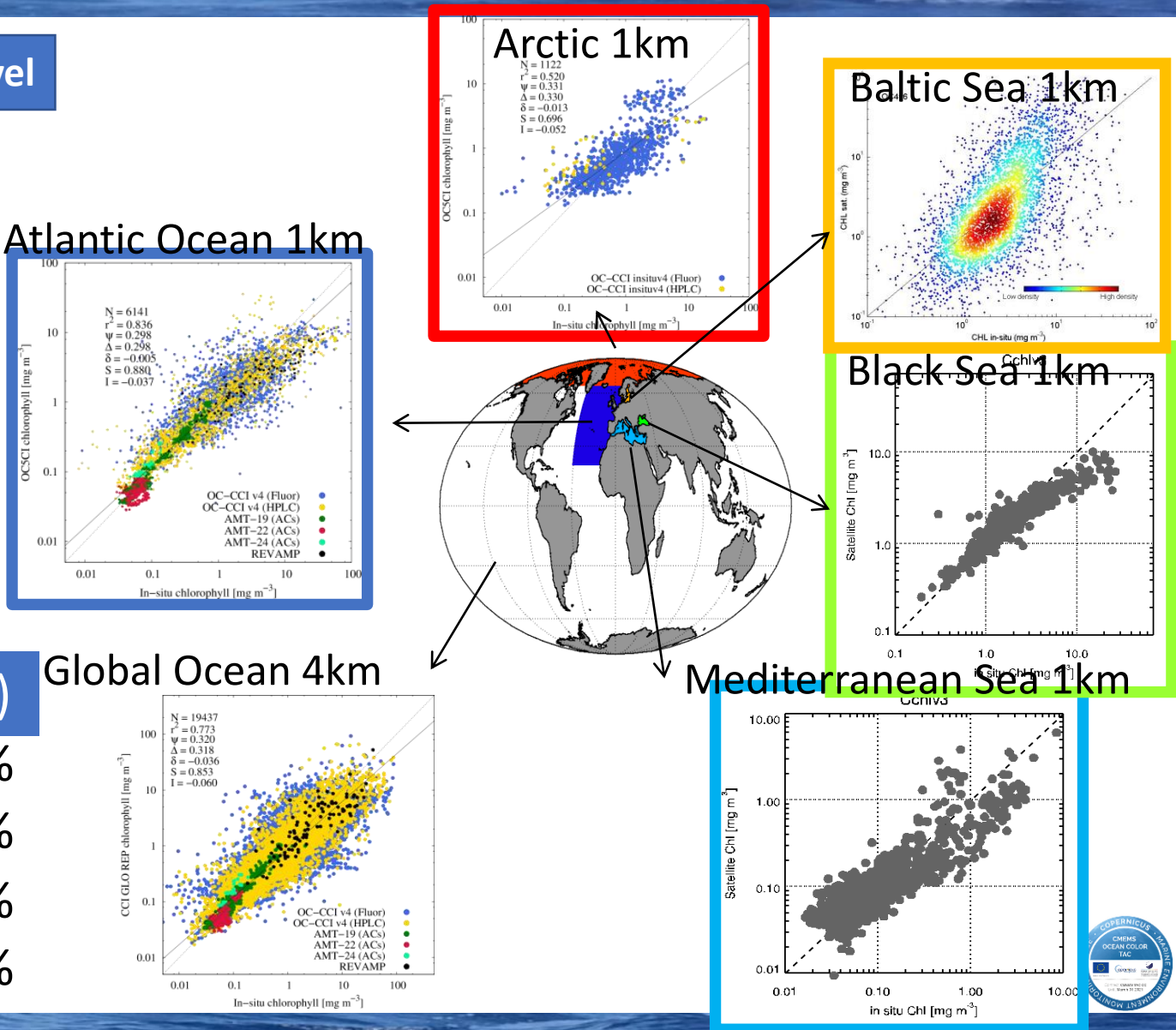


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Black Sea	NRT DT REP	L3/L4
Mediterranean Sea	NRT DT REP	L3/L4
European seas	NRT REP	L3

Data uptake (March 2019 monthly report)

L3	59%	vs	L4	41%
NRT/DT	72%	vs	REP	28%
Regional	58%	vs	Global	42%
Multi-sensor	65%	vs	Single-sensor	35%

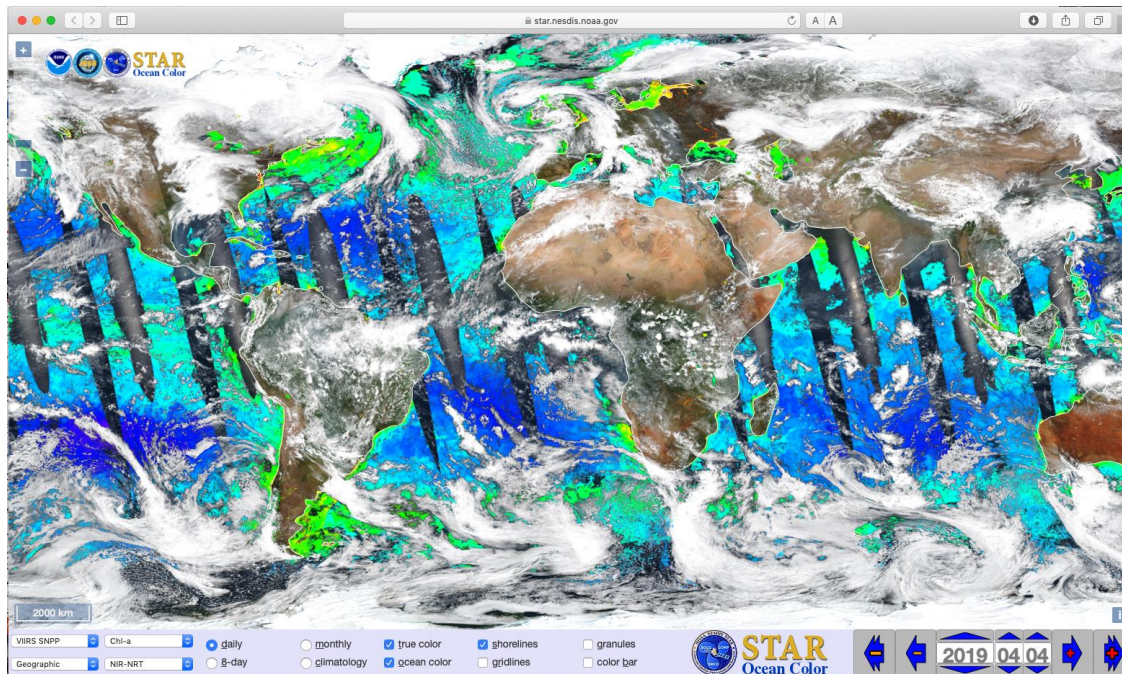


Questions, issues and recommendations

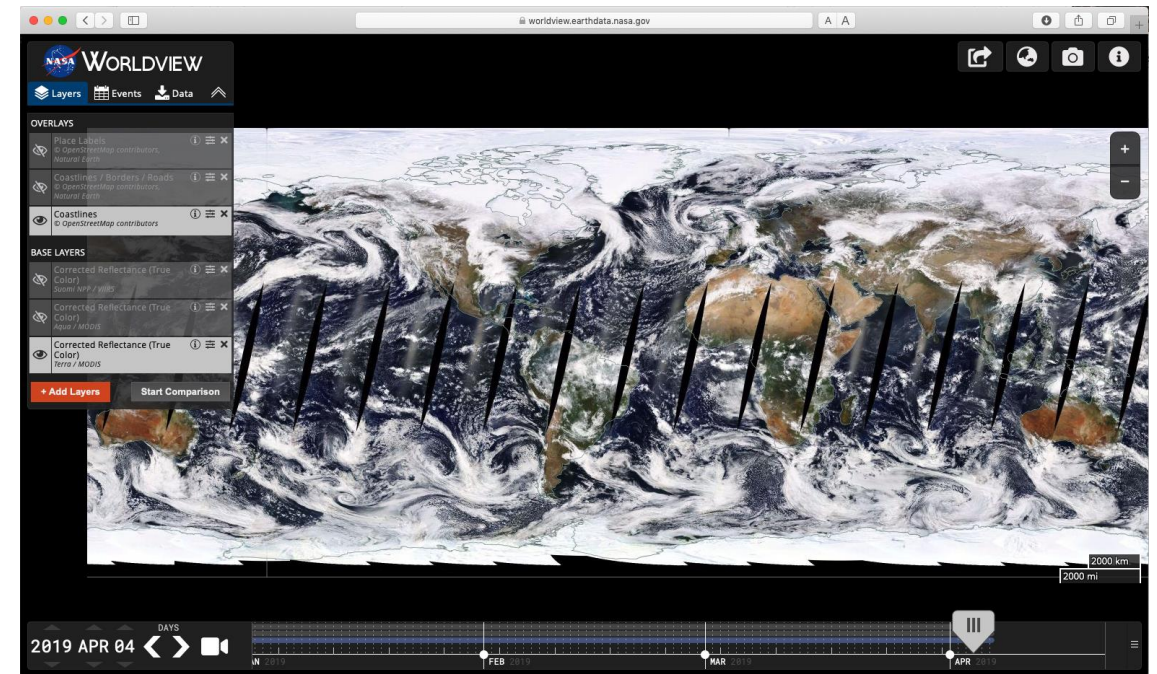
1 – What are the user requirements for operational OC products and where should the main research and technical efforts be concentrated?

From the service point of view we should

- Minimize the delay between satellite sensing and data availability to users
- Provide data availability 24/7
- Provide data accessibility: efficient tools for data browsing/**viewing**/downloading



NOAA



NASA

Questions, issues and recommendations

1 – What are the user requirements for operational OC products and where should the main research and technical efforts be concentrated?

From the service point of view we should

- Minimize the delay between satellite sensing and data availability to users
- Provide data availability 24/7
- Provide data accessibility: efficient tools for data browsing/viewing/downloading
- Provide users with product manuals
 - Data quality (validation analyses)
 - Data processing (ATBDs)
 - Examples on how to use/not to use the data (fitness-for-purpose)
- Standardize data format

Questions, issues and recommendations

1 – What are the user requirements for operational OC products and where should the main research and technical efforts be concentrated?

From the data quality point of view we should

- Use state-of-the-art algorithms
 - Round-robin exercises for both the atmospheric correction and in-water algorithms
 - Regionalization
- Guarantee data consistency across the full time series
- Deliver multi-sensor products
 - To minimize data gaps
 - To minimize confusion for the users

Questions, issues and recommendations

2 – What developments in approaches, techniques and/or tools are needed to address users at multiple levels of sophistication, how best to supply necessary details while not overwhelming as needed for free and open access to data through multiple outlets and serving distinct and diverse audiences?

The service should be oriented towards all potential users (informed and uninformed) in a circular system that should allow efficient information exchange among the various actors

- Adoption of non-specialized* language
- Service desk to answer users' questions
- Tutorials to facilitate new users getting into the system

* Does not mean inaccurate

Questions, issues and recommendations

3 – What mechanisms are useful to bring developers and users together at early stages and how best to engage parties to achieve successful implementation?

The service should be oriented towards all potential users (informed and uninformed) in a circular system that should allow efficient information exchange among the various actors

- User training, workshops, forums, surveys & consultations
- Case studies & tools to efficiently explore the data (online data viewers)

Questions, issues and recommendations

4 – how to know if data are “fit-for-purpose”?

- User registration helps to keep track of data usage to improve the service
- User surveys & consultations